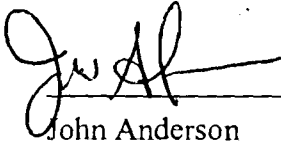


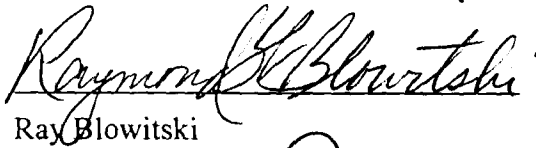
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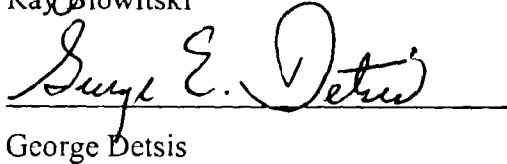
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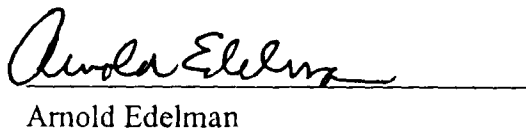
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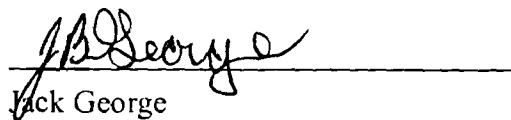
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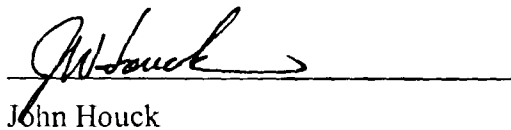
  
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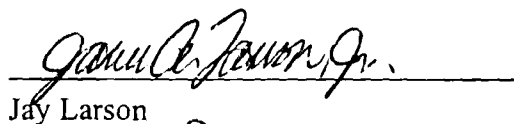
  
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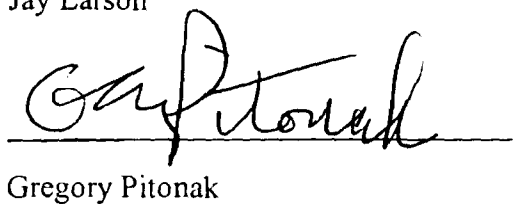
  
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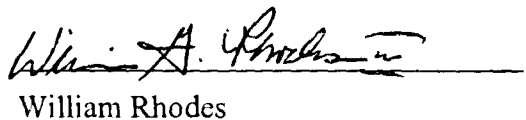
  
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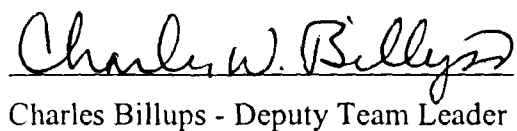
  
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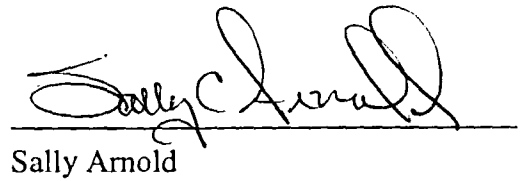
  
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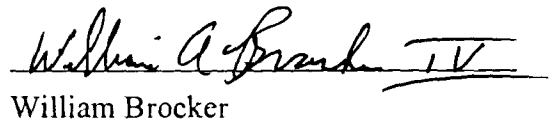
  
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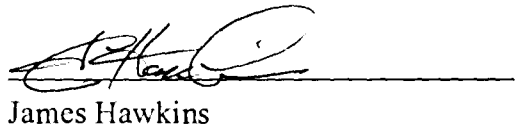
  
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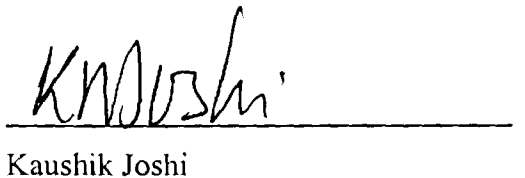
  
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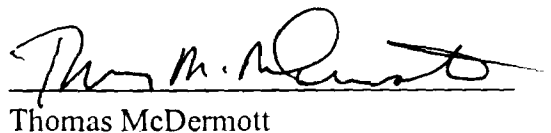
  
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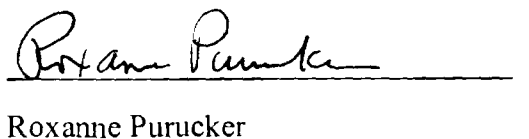
  
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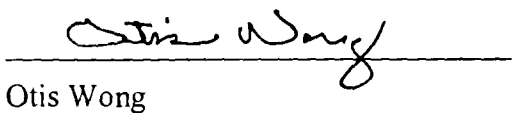
  
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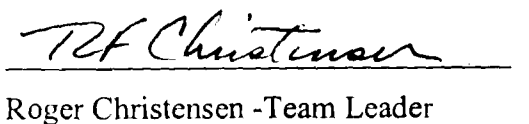
  
James Hawkins

  
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## EXECUTIVE SUMMARY

Department of Energy (DOE) Policy (P) 450.4, Safety Management, System Policy, commits to institutionalizing an Integrated Safety Management System (ISMS) throughout the DOE complex. The DOE Acquisition Regulations (DEAR, 48 CFR 970) require contractors to manage and undertake their work in accordance with a documented Integrated Safety Management System.

The Manager, Chicago Operations Office (CH), initiated a review of a combined Phase I and Phase II Integrated Safety Management Verification to confirm that Brookhaven National Laboratory (BNL) had properly submitted a description of their ISMS, and had implemented ISMS within the Laboratory's facilities and processes. The combined review was requested by the Manager, Chicago Operations Office, based upon the progress BNL had made in establishing the ISMS. The review also included an evaluation of CH-BHG responsibilities related to the implementation of ISMS.

This report documents the results of the review conducted to verify the following points: (1) BNL's description of the integrated safety management system and the enabling documents and processes conform to the guidance given by the Manager, BHG; (2) Corporate policy is implemented by line managers; (3) BNL has tailored their directions to the facility management; and, (4) The Manager, BHG, has written procedures integrating their safety activities and oversight with those of BNL. The general conduct of the review was consistent with the direction provided in the DOE-HANDBOOK -3027-99, June 1999, Integrated Safety Management Systems (ISMS) Verification Team Leader's Handbook and the guidance in DOE G 450.4-1A, ISM System Guide, May 27, 1999.

The purpose of this review was twofold: (1) To provide the Manager, CH Operations Office, with a recommendation on the adequacy of the ISMS description of the Brookhaven National Laboratory based upon its compliance with the requirements of 49 CFR 970.5204 (-2 and -78); and, (2) To evaluate the extent of ISMS implementation within the Laboratory.

The Team recommends approval of the Integrated Safety Management System Description. The evaluation of ISMS implementation indicated that the described system infrastructure is implemented, essential system elements are in place, management and workers demonstrated their commitment, deployment across the Laboratory is varied, and planned improvements should enhance the system's effectiveness. A few of the key Areas for Improvement and Noteworthy Practices are noted below.

### AREAS FOR IMPROVEMENT

#### BNL

- At the institutional level, the self-assessment system needs strengthening. Institutional expectations for management systems assessments have not been developed. As a result, Management cannot be assured that a comprehensive set of management assessments are being conducted. Analyses of causal factors and trends generally are not implemented on a laboratory-wide level on self-assessment results. Self-assessment results are needed for use in other institutional elements for corrective action, trending and causal-factor analyses, Lessons-Learned, Occupational Medicine, and the Price Anderson Amendments Act (PAAA) program. (Criteria Review and Approach Documents (CRADs) 1.3, 1.5, 2.5, 7.1, 7.4, 7.5)
- The overall Laboratory-wide awareness and use of the Lessons-Learned program is low. Processes to enhance feedback and improvement need further development within the Standard Based Management System (SBMS) to link Lessons-Learned to the work planning and training systems. Valuable information is available in self-assessments and external (non-BNL) reviews, but the information is not being robustly captured for feedback and improvement, such as from the work permit process, and Lessons-Learned communications across the entire Laboratory. (CRADs 1.5, 4.5, 5.5, 7.1, 7.4, 7.5)
- The corrective action process at the institutional level needs to be strengthened. There does not appear to be a process to ensure that immediate actions to control hazards are being taken while longer-term corrective actions to address root- and causal- factors are being developed. A large percent of those items being tracked are past

due. Not all items that may have institutional-level implications have been included in the Laboratory-wide tracking system. A significant number of open corrective items are not being completed on a timely basis. (CRADs 1.5, 7.1)

#### **BHG**

- BHG does not have a formal procedure that outlines BHG's Quality Assurance (QA) program as required by DOE O 414.1A, and needs to develop a more formally structured Self-Assessment Program at the Group-wide level. The self-assessment program should include performance objectives and criteria to measure the quality and effectiveness of the Group in carrying out their assigned functions and responsibilities. BHG's Quality Assurance manager has been tasked with the development of a Quality Assurance Plan for the Group. This task is in progress and will include a matrix of QA requirements from both DOE Order 414.1A and ISO 9000. (CRAD 8.2)

#### **NOTEWORTHY PRACTICES**

#### **BNL**

- The requirement that all BNL staff members have a signed Roles, Responsibilities, Accountabilities, and Authorities (R2A2) for their specific job assignment provides an effective mechanism to define employees' roles and responsibilities for ES&H activities related to their work. It also forms the basis to set employees' performance goals and objectives that are directly linked to their work assignment. All employees contacted during the Team's review were keenly aware of their responsibilities related to ES&H activities and could clearly identify them on their R2A2. The use of R2A2s in developing Job Training Assessments (JTAs) further strengthens the employees' ability to perform at a level of competence comparable to their responsibility. (CRADs 1.6, 1.7)
- BNL's Senior Managers have demonstrated a strong commitment and leadership to work in a formally agreed-upon partnership with DOE to achieve a shared vision, critical outcomes, performance goals, and objectives, and achieve excellence in implementing a mature Integrated Safety Management System. This strong commitment to achieving ISMS excellence is evident throughout all levels of Laboratory management, and among the scientific and laboratory support staff and trades. Implementation crosscuts each level of ISMS and is focused on individual and line management accountability for ISMS performance. For example, at the Institutional Level, this is evident in the FY 2000 policy of aligning the performance expectations of all exempt employees with the Laboratory's Critical Outcomes, Objectives, and contract performance measures. This policy will be extended to all non-bargaining-unit employees in FY 2001 to align their performance goals with those of their managers. At the Facility Level, this is evident in the assignment of Building Managers and involvement of ES&H Coordinators. At the Activity Level, it is evident in the Job Training Assessments and Job Hazards Analysis process and the use of Experimental Review Committees and Pre-Job planning and Post-Job critique sessions to ensure work is performed safely. (CRADs 1.1, 1.4, 1.7, 2.1, 2.7, 3.1, 3.7, 7.1, 7.2, 7.3, 7.4, 7.5)
- SBMS ensures easy access for Laboratory personnel and the interested public. The system has hyperlinks to appropriate institutional level policies, guidance, and procedures and ensures configuration control. SBMS maintains control through Management System Stewards who are responsible for all content, updates, and linkages to other documents within the SBMS. Updates are easily made, communicated, and tracked. The SBMS provides input to the Training Management System; training requirements are linked to the SBMS. Outputs from the various SBMS Description and Subject Areas are used to identify training needs along with input from SBMS Stewards, Subject-Matter Experts, and the Training and Qualifications Committee. (CRAD 1.7)

#### **BHG**

- BHG has a strong operational awareness program that is described in the BHG ES&H Management Plan and several BHG procedures that describe the conduct of performance assessments, surveillances, and

walkthroughs, as well as the issues tracking, follow-up and reporting within BHG and to the Laboratory. The strength of the program is based on the comprehensive Facility Representative Qualification process, use of highly qualified Subject-Matter Experts, and the close collaborative interaction of the Facility Representatives and these experts with the Laboratory. In keeping with the Departmental Policy DOE P 450.5 for Line Environment, Safety and Health Oversight, the Subject-Matter Experts have been thorough in identifying ES&H Issues through a comprehensive assessments program. This program has provided significant value to the Laboratory and DOE during the Laboratory's transition to its own Independent Assessment function. (CRAD 8.1)

## 1.0 INTRODUCTION

The Integrated Safety Management System Verification is a review of the adequacy of the description of the Integrated Safety Management System (ISMS) in fulfilling the requirements of the Department of Energy's (DOE's) Policy (P) 450.4, Safety Management System Policy, and the DOE Acquisition Regulations (DEAR, 48 CFR 970). The DEAR rule requires contractors to manage and undertake work in accordance with documented ISMS. Guidance and expectations were provided to Brookhaven National Laboratory (BNL) by incorporating them into the operating contract (Contract DE-AC02-98CH10886).

The contract requires the contractor to submit a description of their ISMS for DOE's approval. BNL submitted their proposed Safety Management System Description for approval on October 28, 1999. The Manager, Brookhaven Group (BHG), tentatively approved its acceptance pursuant to a favorable recommendation from this verification review. BNL submitted an updated Integrated Safety Management Description on March 24, 2000, based upon the self-assessment actions identified in the course of preparing their declaration of readiness for the verification review.

This Integrated Safety Management System Verification, Phase I and Phase II, assessed the adequacy of the ISMS description in fulfilling the requirements of the DEAR and the DOE Policy, and determined the degree of its implementation at the site. It was conducted in support of, and in accordance with, the protocol for the verification process agreed to by the Team Leader, Manager, Chicago Operations Office (CH) and BHG site-manager. The general conduct of the review was consistent with the directions given in DOE-HANDBOOK -3027-99, June 1999, Integrated Safety Management Systems (ISMS) Verification Team Leader's Handbook and the guidance contained in DOE G 450.4-1A, ISM System Guide, May 27, 1999.

## 2.0 PURPOSE

The purpose of this review was to provide the CH Manager with a recommendation regarding approval of BNL's description of the ISMS based upon its compliance with the requirements of 49 CFR 970.5204 (-2 and -78), and to evaluate the extent of ISMS implementation within the Laboratory.

## 3.0 SCOPE

The scope of the review was to verify that the Laboratory had met the letter and intent of the following policy statement:

*'The Department and Contractors must systematically integrate safety into management and work practices at all levels so that missions are accomplished while protecting the public, the worker, and the environment. This is to be accomplished through effective integration of safety management into all facets of work planning and execution. In other words, the overall management of safety functions and activities becomes an integral part of mission accomplishment. ' DOE P 450.4*

This objective was accomplished by reviewing the institutional program for the site to ensure it met the requirements of 49 CFR 970.5204 (-2 and -78) and by verifying that it had been put into effect across all BNL's activities. All facilities maintained by the contract and all processes managed by Brookhaven Science Associates Inc. (BSA) on behalf of the Department of Energy were open for review. The business processes of the contract that specify ISMS and its management through the Standards Based Management System were examined to determine the breadth and level of implementation, as well as the system's robustness.

The Laboratory's ISMS, as established, was expected to demonstrate a full and systematic integration of ES&H activities into management and work practices at all levels so that the Laboratory's mission could be accomplished efficiently and effectively while protecting the workers, public, and the environment. The review considered the depth and breadth of this system against the backdrop of the core functions and guiding principles of DOE P 450.4.

The verification plan was tailored to assure that the contractor's ISMS had been set up using the legal and contractual requirements established for working safely.

## **4.0 PREREQUISITES**

Few prerequisites were identified for this review. The contractor was instructed to allow team members within any facilities maintained by the DOE contract and to give them access to on-going activities as well as to pertinent records and data. The main prerequisite was that the team should have an understanding of the unique management concept represented by the Laboratory's operating system. The organization of the ISMS at BNL is based on a process-oriented integrated management system approach.

BNL's ISMS is a management scheme that is fashioned to meet the needs of a multiple program site. Concepts and programs that parallel standard DOE functional requirements flow-down-systems have been developed and implemented over two years but they do not adhere strictly to those models. BNL's ISMS was tailored extensively to give flexibility in managing a complex range of hazards; however, the expectation imposed by DOE through the contract is that the Laboratory will operate those systems consistently and vigorously throughout its activities.

## **5.0 REVIEW APPROACH**

This review was undertaken in the context of the process-flow model set out in DOE G 450.4. A set of Criteria and Review Approach Documents (CRADs) were tailored to align with the BNL ISMS approach, organized around the attributes in DOE G 450.4, Chapter 3, combining the ISMS Core Functions with Guiding Principles where appropriate.

A set of CRADS was developed for each ISMS horizontal level (Institutional, Facility, and Activity) and for selected topical areas to evaluate the vertical integration. They list the criteria for determining if BNL's Institutional-level systems and processes were established and implemented to meet the stated Objective of each Institutional CRAD. Similarly, the CRADs provide the criteria for determining if BNL's Facility-level systems and processes meet the stated Objective of the Facility CRAD. The Activity-level CRADs are identified as Science & Technology Activities, Site Infrastructure, Science & Technology "User Facility" Operations and Maintenance Activities, and Environmental Restoration and Remediation Activities and evaluated the stated objectives of the CRADs.

Four Topical Areas were reviewed: Environmental Compliance, Radiation Protection, Occupational Safety, and Quality/Self-Assessment. A generic "Subject-Matter-Expert CRAD" was developed for the reviews. The Subject-Matter Experts who carried out these topical reviews then tailored the generic CRAD for each particular use.

The Verification Team also examined the implementation of CH-BHG's responsibilities related to ISMS. The "DOE" CRAD largely centered on the implementation of relevant Functions, Responsibilities, and Authorities Manual (FRAM) and Functions, Responsibilities, and Authorities (FRA) requirements.

### **5.1 Institutional Level**

The Institutional-level review was approached by examining the general structure of the ISMS and comparing it with the criteria and expectations outlined in DOE 450.4 policy and guidance to understand the systems provided through Management System Descriptions. These descriptions contain information about individual management systems including their purpose, ownership, requirements and drivers, customers and outputs, system operations and responsibilities. Key Management Systems were reviewed that offer an overview of the BNL system.

### **5.2 Facility Level**

The approach for reviewing the Facility-level functions was shaped by the relationship between Facilities and Operations (F&O) and the Science and Technology (S&T) organizations. The Safety Assessment Document (SAD), Safety Analysis Report (SAR), Authorization Agreements and Facility Use Agreement (FUA) are all used to



establish the authorization envelope for every activity at BNL. The SAD and SAR set the authorization envelope for the facility. The FUA sets the authorization envelope for buildings that house facilities. The Authorization Agreement sets the authorization envelope for nuclear facilities. The descriptions of the management systems, several Subject Areas, as well as the applicable BNL's manuals were scrutinized. The relationships between the various portions of the FUA were verified to determine if they met the intent of a tailored ISMS, as prescribed by the guidance in DOE 450.4. The adequacy of the coverage of the Authorization Agreements established for BNL's nuclear facilities was explored, and also their linkage to the overall principles and function of ISM. The Safety Analysis Reports and the Safety Assessment Documents were carefully scrutinized to determine the adequacy of the authorization envelope.

Several facilities were selected as the primary targets for review. All facilities maintained by the contract and all processes managed by Brookhaven Science Associates, Inc. (BSA) on behalf of the Department of Energy were open for review. However, to develop the broadest and fullest view of the BNL system, the Team selected several facilities from the list of BNL's industrial-, radiological-, and nuclear- facilities. The depth of implementation of the ISMS within each facility was examined and compared against the CRADs. A top-down approach was used, following a trail of requirements and implementation from top levels of facility management to basic working levels. The ties or connections between the facilities team and the activity groups also were examined. Aspects of work control, authorization agreements, and configuration management were reviewed to demonstrate that they existed between these functional lines.

### **5.3 Activity Level**

The Activity Level for the Laboratory consists of four major categories of work undertaken to accomplish the organization's missions and objectives. Activities range from individual scientific bench-top, daylong projects to large-scale, long-term ones, to site infrastructure construction and maintenance activities. The team approached the Activity Level review by examining the tracking of individual activities through their life cycle, and mapping performance against the established criteria in the CRADS.

The contractor supplied a list of ongoing activities from which the Team selected those to review.

The various tools and processes used to manage and control work were reviewed, placing emphasis on exploring the maturity of the ISM processes governing the work activities. Mechanisms for controlling and authorizing work were explored. Because some processes cut across each other, they were examined by more than one sub-team.

Key line managers were interviewed, as well as individual project managers and their staff, when needed, to track the work activities. As the Laboratory places great importance on the cognizance and authority of individual managers, their particular roles and responsibilities were examined, as well as their staffs' qualifications and competence.

### **5.4 Topical Areas**

Four topical areas were chosen to furnish vertical slices through the ISMS levels described above. Some of these areas represent topics of current interest, while others cover basic elements of the work within the Laboratory. The following areas were covered: Environmental Compliance, Radiation Protection, Quality Assurance/Self-assessment, and Occupational Safety. In each of these topical areas the review covered the adequacy of the procedures, policies, and manuals of practice in flowing the associated requirements through the ISMS process. Key line managers, subject-matter-experts and individual work managers were interviewed.

### **5.5 DOE-BHG**

Two CRADS were used in the DOE-BHG review to examine the BHG's implementation of FRAM/FRA activities related to ISMS. The review also focused on BHG's use of the Prime Contract in managing the contractor's implementation of ISMS. The review provided a vertical slice of BHG's interaction with the Laboratory through each of the ISMS levels. Key line managers, as well as project managers, facility representatives, subject-matter experts, and contracting officers were interviewed. A single subject-matter-expert carried out the review.

## **5.6 Preparation**

The preparation for this review was vital to producing a robust, credible product. Conducting a combined phase I/II review and accounting for the differences between a multi-program laboratory and general production facilities were significant enough to warrant additional effort. Team members were provided electronic access to BNL's web-based management systems, and prepared for the assessment by studying the following documents: The BNL ISMS Verification Plan, DOE P 450.4, DOE G 450.4, BNL ISMS Program Description, and BNL's Self-Assessment. The full team assembled at BNL for a pre-verification site visit on April 11-13, 2000. The contractor described BNL's business management concepts, information/requirements flow through the Standards Based Management System, and the results of their analyses of gaps in the ISMS. The pre-verification site visit was very beneficial in providing team members with the ability to review most of the system before starting the fieldwork.

The Team Leader reviewed the qualifications and training of the members before the verification and obtained team approval from the CH Manager. The Team Leader finalized preparations by providing the CH Manager with specific dates for the review and submitted the final approved verification plan.

## **5.7 Process**

The Team used the criteria set forth in the Criteria Review and Approach Documents (CRADs) found in Volume II of this report for ascertaining the Laboratory's adherence to the functions and principles of an integrated Safety Management process and for implementing that program in its work. Sub-team leaders were responsible for conducting their investigations to ensure that all assigned CRADs were fully evaluated, and for preparing the appropriate documentation. The Volume II CRADs were completed, and include the results of the contractor's self-assessment and the verification team's review. Factual accuracy was achieved through interactions between the team members and their appointed BHG and BNL points-of-contact.

An executive briefing of the key results and conclusions of the verification was provided to the CH Manager, Dr. San Martin, on May 11, 2000. Team members and representatives from BHG and BNL management participated in the briefing.

# **6.0 ADMINISTRATION**

## **Team Composition and Organization**

Roger F. Christensen, DOE RL, Director for Science and Technology Operations, was named Team Leader for the BNL ISMS Verification Review.

Team members were selected based upon the following criteria:

- established expertise in one or more functional areas
- experience in appraisals
- familiarity with the site
- knowledge, understanding, and training on Integrated Safety Management

The Team's qualifications were validated by the Team Leader and documented in accordance with the Team Qualification Summary found in Volume II of this report.

## **6.1 Site Coordination and Support**

BHG and the contractor's staff assisted the team and supported them as needed during the visit.

The Operations Management Division (OMD) hosted the team and provided the primary support. Robert Desmarais was the OMD Director. William Harold was the principal point-of-contact. BNL provided hosts for each of the sub-teams. These hosts coordinated interviews, gathered the requested documentation, and provided transportation and ready access to facilities. Offices and conference rooms were set aside for the visiting team.

## 6.2 Schedule

The review began on May 1 and continued through May 11, 2000. A preliminary visit was made to receive the requisite ISMS training and to gain on-site training, familiarization, and instruction.

The daily schedule included a brief morning discussion with team members. A closeout meeting was held at 4:30 p.m. each day with an emphasis being placed on discussing the sub-teams' preliminary results, and sharing observations, strengths and issues. Additionally, these meetings were an opportunity for exploring potential avenues for the next day's review. The meetings were conducted openly, allowing BHG and Laboratory participation as desired. A final closeout briefing was held with the CH Manager, BHG, and Laboratory Senior staff.

## 7.0 CONCLUSION

The Team found that the BNL ISMS Description and enabling documents and processes conform to the safety management guidance (DOE G 450.4), and the requirements of the DEAR (49 CFR 970.5204 (-2 and -78)). The Team recommends that the BNL ISMS Description be approved.

Managers have effectively tailored corporate policy and enabling documents and processes for the specific mission and hazards of their facilities. Safety management has been implemented by a Standards Based Management System and supplementing procedures and processes. The degree of system deployment is varied across the Laboratory. The team identified no further issues that had not been already identified by the Laboratory's own self-assessment.

The contractor, BHG, and team concluded BNL's ISMS is implemented and has no systemic or structural deficiencies. While basic feedback programs are in place, there is a need for continued focus on improving the robustness of certain technical aspects of the self-assessment program elements, corrective-action tracking processes, and lessons-learned sharing. Because BNL previously identified these improvement areas, the Laboratory already has begun to establish initiatives (e.g., within the FY 01 Critical Outcome elements and new self-assessment Subject Area) that will focus on improving the degree of consistency by which the ISM elements are deployed across the Laboratory. The team concurs with this improvement in focus.

The BHG's and BNL's demonstrated commitment for the established approach should increase the system's effectiveness and lead to continuous improvement in assuring work is performed safely.

The team concluded BHG is making effective use of the prime contract to manage the Laboratory's performance, and that the Group personnel are fulfilling their ES&H roles and responsibilities as described in the FRAM and the ES&H Management Plan to ensure ISMS implementation at BNL. There is a need to revise or develop some procedures and to establish a formal Quality Assurance Plan and self-assessment program. BHG had previously identified these areas for improvement and is making progress in correcting them.

## 8.0 LIST OF DEFICIENCIES

The numbers that follow the deficiency correspond to the associated Criteria Review and Approach Document.

### BNL

- None Identified.

### BHG

- None Identified.

## 9.0 LIST OF AREAS FOR IMPROVEMENT

The numbers that follow the area for improvement correspond to the associated Criteria Review and Approach Document.

### BNL

- At the Institutional level, the self-assessment system needs strengthening. Institutional expectations for management system assessments have not been developed. As a result Management cannot be assured that a comprehensive set of management assessments are being conducted. Analyses of causal factors and trends generally are not implemented on a laboratory-wide level on self-assessment results. These results are needed for use in other institutional elements for corrective action, trending and causal-factor analyses, lessons-learned, Occupational Medicine, and the Price Anderson Amendments Act (PAAA) program. (CRADs 1.3, 1.5, 2.5, 7.1, 7.4, 7.5)
- The overall Laboratory-wide awareness and use of the Lessons-learned program is low. Processes to enhance feedback and improvement need further development within the SBMS to link Lessons-learned to the work planning and training systems. Valuable information is available in self-assessments and external (non-BNL) reviews, but the information is not being robustly captured for feedback and improvement, such as from the work permit process, and lessons learned communications across the entire Laboratory. A laboratory-wide, employee-suggestion system will help involve workers in the feedback improvement processes. (CRADs 1.5, 4.5, 5.5, 7.1, 7.4, 7.5)
- The corrective action process at the institutional level needs to be strengthened. There does not appear to be a process to ensure that immediate actions to control hazards are being taken while longer-term corrective actions to address root- and causal- factors are being developed. A large percent of those items being tracked are past due. Not all items that may have institutional-level implications have included in the Laboratory-wide tracking system. A significant number of open corrective items are not being completed on a timely basis. (CRADs 1.5, 7.1)
- BNL lacks a documented process to provide the methodology for reviewing and approving of the Health & Safety Plans of subcontractors. (CRAD 4.2)
- Document-control processes at the Plant Engineering Division for ES&H-related procedures need to ensure that they are periodically reviewed and revised as necessary. (CRAD 4.3)
- The BNL Training and Qualifications Management System Description does not clearly demonstrate how BNL's training requirements apply and are tracked for subcontractors. (CRAD 6.7)
- BNL needs to establish a system to ensure that users and guests are medically qualified to perform work and are under medical surveillance as required by DOE and OSHA. In such a system, BNL should identify essential job tasks, chemical and physical hazards, and provide this information to the user/guest. (CRAD 1.3)
- A written Subject Area or Program Description that documents the processes for strategic/institutional planning, critical outcomes, objectives, and institutional performance measures within the Integrated Planning Management System should be developed to improve consistency in the strategic and integrated planning processes across the Laboratory. (CRADs 1.1, 1.4)
- On an Institutional level, ESH Standard 1.3.6 should be modified to make its requirements more consistent with line management's noteworthy implementation of it. The following are opportunities for improving ESH 1.3.6, Work Planning and Control:
  1. Defining the processes that develop, approve, and implement standard operating procedures, specific work procedures, and Job Safety Analyses, or establish links between them.
  2. Clearly explaining that for tasks with specific hazards other controls must be implemented to reduce the ESH risk rating, e.g., lockout/tagout, or confined space entry permit.

3. Include in ESH 1.3.6 Attachment 6: Work Control Self-Assessment a requirement to observe work in progress to evaluate the implementation of work controls. (CRADs 1.2, 1.3)
- The Employee Handbook, along with training, provides the initial introduction to safety roles and responsibilities for the new employee. However, the Safety section of the Handbook does not make any reference to Integrated Safety Management or the Standards Based Management System. Updates are manual and require mass mailings; the document is not available on the Web. (CRAD 1.6)
  - The Quality Program is in transition with large variability in implementation across the Laboratory. Recently, BNL management's attention intensified and improvement actions are to be demonstrated. (CRAD 7.5)
  - Where priority on the work, hazards, controls, work-execution functions has been demonstrated, it is now appropriate to bring BNL's and BHG's focus on the feedback and improvement loop of ISMS. The ISMS framework looks to the design and execution of this loop wherein the measures for demonstrating performance are considered early in the processes of work definition/hazard identification and control. Improvement is needed in tying the feedback loop into the up-front thinking of ISMS at BHG/BNL. (CRADs 7.1, 7.4, 7.5)
  - The Preventive Maintenance prioritization system is not as well defined or documented within program facilities. Different methods are used within the various facilities reviewed by the Team. Consistency is needed across the various BNL facilities. Deferred preventative maintenance and associated risk should be reviewed by management and documented as acceptable. (CRAD 2.1)
  - The development of the Building Manager Subject Area should be completed and the position of Building Manager Program Manager should be filled. These actions will greatly solidify the Building Managers' program, the maintenance of FUAs, and consistency across programs. (CRAD 2.6)

## **BHG**

- Several BHG Procedures related to the Work Control Process need updating. The approval and authorization process for smaller conventional construction projects, such as General Plant Projects (GPP), Accelerator Improvement Project (AIP), and Special Materials (SM) projects, has evolved into a programmatic approach. However, because of recent changes in the Contractors work development processes and SMBS subject areas and processes, BHG Procedures that guide the Project Managers on project approval, authorization, change control, and close-out need to be updated. BHG is making revisions to these directives with an expected completion date of August 2000. (CRAD 8.1)
- There is no formal BHG procedure that describes the Critical Outcomes Development or Change Process. However, the Prime Contract (Articles 6, 7, 72, and Appendix B) does establish the basis for the process. BHG's senior- and mid-level management is knowledgeable about the process used for establishing/negotiating the measures with the BNL contractor and for change control. A BHG Procedure is under development. (CRAD 8.1)
- BHG does not have a formal procedure that outlines BHG's Quality Assurance (QA) program as required by DOE O 414.1A, and needs to develop a more formally structured Self-Assessment Program at the Group-wide level. The self-assessment program should include performance objectives and criteria to measure the quality and effectiveness of the Group in carrying out their assigned functions and responsibilities. BHG's Quality Assurance manager has been tasked with developing a Quality Assurance Plan for the Group. This task is in progress and will include a matrix of QA requirements from both DOE Order 414.1A and ISO 9000. (CRAD 8.2)

## **10.0 NOTEWORTHY AND GOOD PRACTICES**

The numbers following the noteworthy and good practices correspond to the associated Criteria Review and Approach Document.

## BNL

- The work- planning processes found under ES&H standard 1.3.5 and 1.3.6 and other departmental/divisional procedures that are implemented at facilities for both scientific and laboratory operations work were effective. These work- planning processes were well understood by all levels of employees and involve workers in identifying the hazards and developing and implementing tailored hazard controls. These work- planning processes also ensure effective mechanisms to control and coordinate activities to ensure that the work to be performed is authorized by line management. (CRADS 2.1, 3.2-4, 4.2-4, 6.2-4, 7.3).
- The requirement that all BNL staff members have a signed Roles, Responsibilities, Accountabilities, and Authorities (R2A2) for their specific job assignment provides an effective mechanism to define employees' roles and responsibilities for ES&H activities related to their work. It also forms the basis to set employees' performance goals and objectives which are directly linked to their work assignment. All employees contacted during the Team's review were keenly aware of their responsibilities related to ES&H activities and could clearly identify them on their R2A2. The use of R2A2s in developing Job Training Assessments (JTAs) further strengthens the employees' ability to perform at a level of competence comparable to their responsibility. (CRADs 1.6, 1.7)
- BNL's Senior Managers have demonstrated a strong commitment and leadership to work in a formally agreed-upon partnership with DOE to achieve a shared vision, critical outcomes, performance goals, and objectives, and achieve excellence in implementing a mature Integrated Safety Management System. This strong commitment to achieving ISMS excellence is evident throughout all levels of Laboratory management, and among the scientific and laboratory support staff and trades. Implementation crosscuts each level of ISMS and is focused on individual and line management accountability for ISMS performance. For example, at the Institutional Level this is evident in the FY 2000 policy of aligning the performance expectations of all exempt employees with the Laboratory Critical Outcomes, Objectives, and contract performance measures. This policy will be extended to all non-bargaining unit employees in FY 2001 to align their performance, and goals with those of their managers. At the Facility Level, this is evident in the assignment of Building Managers and involvement of ES&H Coordinators. At the Activity Level, it is evident in the Job Training Assessments and Job Hazards Analysis process and the use of Experimental Review Committees and Pre-Job planning and Post-Job critique sessions to ensure work is performed safely. (CRADs 1.1, 1.4, 1.7, 2.1, 2.7, 3.1, 3.7, 7.1, 7.2, 7.3, 7.4, 7.5)
- SBMS ensures easy access for laboratory personnel and the interested public. The system has hyperlinks to appropriate institutional level policies, guidance, and procedures and ensures configuration control. SBMS maintains control through Management System Stewards who are responsible for all content, updates, and linkages to other documents within the SBMS. Documents updates are easily made, communicated, and tracked. The SBMS provides input to the Training Management System; training requirements are linked to the SBMS. Outputs from the various SBMS Description and Subject Areas are used to identify training needs along with input from SBMS Stewards, Subject Matter Experts, and the Training and Qualifications Committee. (CRAD 1.7)
- Pollution Prevention/Waste Minimization activities are well integrated into all aspects and levels of the Laboratory's operations and activities. This is achieved through incorporation and consideration of environmental management principles within the ISMS. Planning and procurement activities consider the environmental impacts of the work/research to be conducted. A laboratory- wide process assessment has been conducted on all major industrial and research activities to ensure that environmental impacts are considered and, as appropriate, efforts are taken to reduce or eliminate the environmental impacts through source reduction and process modification. The Work Planning and Experimental Review processes provides a mechanism to allow the direct involvement of line management and workers in identifying opportunities for pollution prevention/waste minimization from their work activities. (CRADs 1.2, 1.3, 7.2)

## **BHG**

- BHG has a strong operational awareness program that is described in the BHG ES&H Management Plan and several BHG procedures that describe the conduct of performance assessments, surveillances, and walkthroughs, as well as the issues tracking, follow-up and reporting within BHG and to the Laboratory. The strength of the program is based on the comprehensive Facility Representative Qualification process, use of highly qualified Subject-Matter-Experts, and the close collaborative interaction of the Facility Representatives and these with the Laboratory. In keeping with the Departmental Policy DOE P 450.5 for Line Environment, Safety and Health Oversight, these Experts have been thorough in identifying ES&H Issues through a comprehensive assessments program. This program added significant value to the Laboratory and DOE during the Laboratory's transition to its own Independent Assessment function. (CRAD 8.1)
- The BHG ES&H Management Plan in conjunction with the BHG Functions, Responsibilities, and Authorities Manual (FRAM) provides a detailed listing of the assigned responsibilities at BHG. The responsibilities, and authorities of BHG personnel are aligned to the guiding principles and core functions of ISM. The ES&H Management Plan goes beyond the requirements of the FRAM in fully documenting BHG's ES&H programs. (CRADs 8.1, 8.2)
- There is a strong commitment by BHG's management and staff to work in partnership with the Laboratory, per Departmental Policies DOE P 450.4 and DOE P 450.5, to achieve all shared critical outcomes, performance goals, and objectives, and to achieve excellence in implementing ISMS. BHG's management and staff have also demonstrated a commitment to fostering continuous improvement at the Laboratory and within the Group functions. (CRAD 8.2)

## **11.0 LESSONS LEARNED**

The purpose of this section is to provide feedback improvement data to the Safety Management Implementation Team so that lessons from the BNL ISMS Verification can be factored into improving guidance to future Team Leaders and Team Members in the conduct of SMS reviews. Although these represent a roll-up from team input, each of these lessons learned may not necessarily represent a consensus view of the team members.

- Combined Phase I/II Verification  
There are improvements in efficiencies and effectiveness that come from combining Phase I/Phase II. It is difficult to make judgments about the description of the ISM system without interviews and follow-up observations that show the description is understood and owned by all levels. The combined review generally was viewed as effective for this verification.
- Electronically Deployed (Web-based) ISMS  
The SBMS web-based approach is very helpful and resource-efficient in learning the system and performing the verification. It would still be difficult to perform a Phase I verification remotely based on the need for conformation of understanding Phase I description.
- Guidance on Key Outcomes from Verification Steps  
Guidance on key outcomes could help the Team Leader, the DOE Site and Laboratory/Facility manage logistics more effectively and efficiently. This guidance could address the some key steps in the Verification process:
  - Expectations for Pre-visits
  - Expectations between Pre-Visit and On-Site visit
  - Expectation of DOE/Site and Laboratory escorts/points-of-contact
  - Team Meetings

Regarding the period between the Pre-visit and On-site visit, clear expectations of Team members would aid them in managing their time to collect and review documents, understand what they have read, collect additional documents from the Laboratory and set up interviews. For the BNL Verification, a period of four

weeks between the pre-verification and on-site verification would have helped the members carry out these collateral duties.

Regarding Team Meetings, clarification of desired outcomes for types of Team meetings could help the Team Leader design and schedule specific meetings to accomplish specific outcomes. Team members identified the need for both closed (team-only) and open meetings. Closed meetings would accomplish team dialogue and binning of preliminary findings (concerns, issues, deficiencies, areas for improvement, noteworthy practices) for immediate disposition (closeout or further exploration). Open meetings with the DOE site and Laboratory staff allowed for ongoing factual accuracy and identification of additional documents and interviewees for Team members' follow-up.

- Tailoring of CRADs to Specific Verifications  
Clarification in the ISM guidance and Team Leaders Handbook is needed on the desired outcomes for the tailoring of CRADs. Team members were divided on the importance of using the Handbook CRADs versus using site-tailored CRADs.
- Qualification/Selection of Verification Team Leaders – The success of the Verification Team operations and products are strongly tied to the competencies of the Team Leader. The DOE approach to identifying Team Leaders could be improved by using a criteria-based process. Two criteria are offered for consideration:
  - Knowledge/skills/abilities (KSAs) that demonstrate competency in integrated management of line program and ES&H systems, processes, activities-- These KSAs are not achieved only through serving on prior ISMS Verification Teams.
  - Specific knowledge of the programmatic mission – Program familiarity can aid the Team Leader in assuring that the Teams' results are best communicated to the primary- and secondary- customers and other stakeholders and interested parties.

The BNL ISM Verification Team Leader was well qualified against these criteria and the performance of the Team and the quality of the product benefited greatly.



## TEAM LIST AND ASSIGNMENT AREAS

TEAM MEMBER	ASSIGNMENT
Roger Christensen	Team Leader
Charles Billups	Deputy Team Leader
Raymond Blowitski	Brookhaven Group
Arnold Edelman	Institutional Sub Team Lead
James Hawkins	Institutional ISMS
Thomas McDermott	Institutional ISMS
Roxanne Purucker	Institutional ISMS
William Brocker	Institutional ISMS
Gregory Pitonak	Facilities Sub Team Lead
George Detsis	Facilities ISMS
Jack George	Facilities ISMS
Joseph DiMatteo	Activities Sub Team Lead
John Houck	Science and Technical User Facilities Activities ISMS
John Anderson	Site Infrastructure Activities ISMS
Carter Ficklen	Science and Technical Program Activities ISMS
Sally Arnold	Environmental Restoration Activities ISMS
Jay Larson	Occupational Safety Topical Area ISMS
Kaushik Joshi	Environmental Compliance Topical Area ISMS
William Rhodes	Radiation Protection Topical Area ISMS
Otis Wong	Quality Assurance/Self-assessment Topical Area ISMS